

## Using the EU Funds between 2007 and 2013 from a Development of Disadvantaged Regions Perspective: the Case of Polish Regions

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### Abstract

*It is still quite fresh and fetching opportunity to gaining additional financial resources from EU funds for Central and Eastern European economics which changed to a free market not long ago. In regional pattern of such countries disadvantaged regions dominate. These undeveloped regions belong among the less wealthy European Union's areas which mean they are covered under the objective Convergence of EU cohesion policy 2007 - 2013. This status causes the regions eligible to use huge amount of financial resources in order to improve its economic performance and the standard of living conditions of its inhabitants. The availability of so much "easy money" creates enormous pressure to spending and putting capital in many developing projects. However, not in every case may these projects be in accordance with rational allocation of economics resources. The rule of co-finance allows a maximum of 85% of eligible costs to be covered; so the issue is that using of EU funds provokes some national resources as well. Hence, by incorrect spending from EU funds the citizens can fall into a fiscal illusion i.e. their demand for development is distorted and doesn't matched to what citizens truly need. Such behaviour can result to making serious troubles through waste of money and getting into debt while the citizens demand for such issues unconsciously rise.*

*The aim of this paper is to examine the development of using financial resources from EU funds between 2007 and 2013 within the Polish NUTS II regions in the aspect of the two sector model of national economy; to decide which fields of interest are influenced by EU funds (based on causality testing in the conventional Granger sense or the Toda-Yamamoto augmentation); and to evaluate the development of ratio between EU funds and national resources putted into co-financed projects.*

*The analysis - applied on quarterly data - was divided into two main parts. The first part is focused on the two sector model: households sector is analysed by development of labour market indicators, and producing sector is analysed by development of financial results of enterprises. Another part targets the development of using EU funds in comparison to national contributions of co-financed projects. Based on empirical results, we can suggest that the influence of funding on regional variables is quite ambiguous. We can say that some causality from EU funds to the variables exists only within some regions, but not in general. Furthermore, among the variables of households rather than among the variables of enterprises some causality relationships have been found. The highest figure of existing relationships has been detected within the variable of average wages and salaries. In connection with another part of the analysis results, we can assume that employing of national resources cause selected variables much more than EU funding itself. We can suggest that the findings are valid in a wider context and can be applied to many other disadvantaged regions. Beyond that, the conclusions can give some little advice for forthcoming period of EU cohesion policy 2014 - 2020.*

**Key words:** EU funds, Granger causality, disadvantaged regions, Cohesion policy, Poland.

**JEL Classification:** R10, C21

## 1 Introduction

Cohesion policy should be considered as an important source of finance for all regions of the EU member states but for disadvantaged areas in particular. There is no doubt that financial resources from EU funds – which are provided under the aim of cohesion - symbolize great opportunity to make a step to shift the regions forwards or perhaps even towards a commonweal. This development should be caught through improvements within economic performance of each eligible region and living conditions of its inhabitants. Existence of such kind of support is well significant especially for the less wealthy European Unions' areas, so called disadvantaged or undeveloped regions – with a GDP per capita below 75% of the EU average -, because these regions have been qualified to receive largest part of transfers from the EU budget between 2007 and 2013. Becker et al. (2008) claim that in comparison to other supranational blocs, the magnitude of equalization transfers is particularly large within the EU. The allowance of these financial inflows, let us say, exogenous financial resources, should be particularly significant within the Central and Eastern European economics. These economics – former centrally planned - have been transformed not long ago, and most of their regions have been qualified as eligible to receive EU funding under the Objective 1 – Convergence.

The truly important issue is not whether EU funds should influence development of regions, but whether they do or don't is relevant question at first. Investigating the impacts of EU funding on the economic performance belongs to quite popular topics, since the financial resources share allocated in the Cohesion policy significantly raised. Many empirical results have shown that the conclusions about EU funding influence on regional development are pretty ambiguous. For example, one of first pioneers of this topic Sala-i-Martin (1996) found no evidence of higher regional growth and convergence within the EU states in comparison to the other states which had no equivalent of EU funding available. Later study by Beugelsdijk and Eijffinger (2005) claims that higher degree of EU funding influenced significantly the regional output in EU 15 states. Mohl and Hagen (2010) came to similar conclusions that higher payments from EU funds are connected with higher regional performance. In addition, some latest specific aimed studies couldn't offer unambiguous answers about EU funding significance as well: Bieganska et al. (2014) detected that EU funds contributed significantly to the quality of life from the creation of free time activities improvement perspective in regions of Poland. In another recent study aimed on other countries of the same region investigators suggest that national sources influenced the investments of the Czech Republic, Slovakia and Hungary rather than EU funds availability Hudec et al. (2014).

The availability of EU funds, and “easy money” of them, creates enormous pressure to drawing and putting capital in many developing projects. However, not in every case may these projects be in accordance with rational allocation of economic resources. The rule of co-finance allows a maximum of 85% of eligible costs to be covered; so the issue is that using of EU funds provokes some national resources as well. Hence, by incorrect using of EU funds the citizens can fall into a fiscal illusion i.e. their demand for development investments is distorted and doesn't matched to what citizens truly need. Such behavior can result to making serious troubles through waste of money and getting into debt while the citizens demand for unidentified issues unconsciously rise.

The aim of this paper is to analyse the influence of EU funds spending on selected variables of households and enterprises sectors' development of the regions of Poland during the 2007 to 2013 programming period. The analysis doesn't want to quantify specific effects of EU funding, for now, but focuses on providing some clear evidence of causation or non-causation, respectively. The causality testing in Granger sense (Granger, 1969, 1988) has been accepted as a relevant tool to decide about existence of impacts in the direction from EU funds to selected regional variables of households and enterprises. This advanced approach can be considered as much more relevant than studies based on correlation analysis or time comparison analysis either.

After answering the above-mentioned causality question, we can extend the knowledge in Cohesion policy of the EU connections and issues, and furthermore suggest in which ways are the economic variables influenced at most, and vice versa. Clear evidence of causality relationships existence from EU funds to regional indicators should be considered as truly crucial issue that every advanced regional intentionally aimed analysis has to hold at the beginning; afterwards, it allows developing any advanced conditionally aimed studies of regional development issues. Even though this study is aimed to the regions of Poland, it may be presumed that findings will be relevant not only for Polish regions but they are valid in a wider context and can be applied to many other disadvantaged regions; yet, especially to countries which passed transition process not long ago. The nature purpose of this study is also to give some little advice for the forthcoming period of EU cohesion policy 2014 - 2020, since its framework already began. We can suggest that this topic will likely remain very actual issue in the nearest future for most disadvantaged regions.

## 2 Methodology

In the first step to fulfil its objective, the input data were needed to be obtained and modified in the right form. The information on quarterly time series have been linked from two sources. The data on labour market indicators i.e. average wages and salaries, unemployment rate, employment rate and vacancies; the data on financial resources of enterprises i.e. revenues, current assets and gross profit; and the data of price indices were collected from the Local Data Bank of Central Statistical Office of Poland (GUS, 2014). The volumes on unemployment rate, employment rate and vacancies have been adjusted for seasonal variation based on the TRAMO-SEATS algorithm, which is standard approach, well recommended by Eurostat (2009). The time series on average wages and salaries, revenues, current assets and gross profit have been adjusted for inflation of a fixed price period at 2007q1. The information on using the EU funds were collected from the European Funds Portal of Poland (PFE, 2014). Unfortunately these data are published for each individual project and they are not disclosed in any regional aggregated form. This issue has been resolved by data aggregation at the NUTS II level in the form of a quarterly data. Although to be able to do such aggregation two simplifying assumptions have been taken into account. First assumption refers to the constant funding over project length. In addition, second assumption refers to the constant funding over each started quarter or every started quarter is considered as fully-used, respectively. Someone could regard these assumptions as too excess but if we respect that most projects have to be financed continuously (no matter of date of conversion of funds to the final recipient, as well as no matter of the actual nature of money), and official statistics are not disclosed, we may perhaps think these assumptions fit.

The quarterly data cover the whole last European funding period between 2007 and 2013. Regarding to application of the  $n+2 / n+3$  rule, the first quarter after (2014q1 – later data not yet available) has been included as well. Therefore, the quarterly analysis covers 29 periods in total. The analysis don't aim the absolute values of above-mentioned indicators, it is focusing on their dynamics and its associations. Hence, the values have been transformed and analyzed in the form of their percentage change (quarter on quarter).

The quarterly data analysis is developed as follows. We check for stationary of the volumes at first, where the conventional unit root test – augmented Dickey-Fuller test (ADF) - is applied. To determine the most suitable lag lengths, this analysis uses the so called Akaike's information criterion (AIC). If the null hypothesis of ADF test (non-stationary) can't reject, then the first (perhaps even the second) differences are employed. By testing via ADF, we can get the level where the stationary achieves. Based on its results, the orders of integration per each series can be established. In the next step, we estimate a vector autoregressive model (VAR). Within this procedure, we must estimate the endogenous variables and specify their maximum lag lengths of VAR which we can find via AIC. After this first round of modifying VAR, situation depends on what have we found by establishing of integration orders. If all variables under examination are stationary (integrated of the same order - zero), we can test for Granger causality using the standard Granger test (Granger, 1969). However, if the condition of stationary fails then we could to approach the Toda-Yamamoto (1995) version of testing for Granger causality. The modification of Toda-Yamamoto solves a failure of Wald test by asymptotic chi-square distribution which occurred when examined volumes are non-stationary. Simply way we can say that Toda-Yamamoto approach has great benefit: it adds extra lags into VAR and we don't have to additional testing for co-integration at the same time. In addition, the following Wald test is proceeding without these extra lags while the degrees of freedom remain unchanged, respectively. This little augmentation allows us to study non-stationary volumes by quite easily testing for Granger causality.

### 3 Empirical Results and Discussion

Since the aforementioned standard way of testing for Granger causality requires stationary volumes, the unit root tests have to be made. The results of classical unit root testing, well known as the ADF, on examined variables are presented in Table 1 and Table 2, respectively. The order of integration (bolded figures) indicates the level, where variable is reported for stationary. To determine the non-zero orders of integration we use the classical series transformation in its difference.

**Tab. 1 Results of ADF unit root tests on EU funds and variables of enterprises**

REGION	EU FUNDS			ENTERPRISES								
				Revenues		Current assets		Gross profit				
ŁÓDZKIE	-5.074	***(2)	<b>1</b>	-6.312	***(2)	<b>0</b>	-4.850	***(0)	<b>0</b>	-6.046	***(0)	<b>0</b>
MAZOWIECKIE	-9.774	***(0)	<b>1</b>	-3.309	** (6)	<b>0</b>	-3.332	** (5)	<b>0</b>	-5.607	***(0)	<b>0</b>
MAŁOPOLSKIE	-4.953	***(1)	<b>1</b>	-2.736	* (6)	<b>0</b>	-5.506	***(0)	<b>0</b>	-2.848	* (6)	<b>1</b>
ŚLĄSKIE	-5.626	***(2)	<b>1</b>	-9.950	***(0)	<b>0</b>	-3.404	** (1)	<b>0</b>	-4.648	***(0)	<b>0</b>
LUBELSKIE	-8.896	***(2)	<b>2</b>	-7.316	***(0)	<b>0</b>	-4.839	***(0)	<b>0</b>	-5.189	***(1)	<b>0</b>
PODKARPACKIE	-5.389	***(2)	<b>1</b>	-5.395	***(1)	<b>0</b>	-6.573	***(0)	<b>0</b>	-4.904	***(0)	<b>0</b>

PODLASKIE	-2.669	*(0)	<b>0</b>	-10.143	*** (0)	<b>0</b>	-3.364	** (3)	<b>0</b>	-5.740	*** (0)	<b>0</b>
ŚWIĘTOKRZYSKIE	-3.429	** (5)	<b>1</b>	-3.063	** (6)	<b>0</b>	-3.343	** (6)	<b>0</b>	-4.643	*** (0)	<b>0</b>
LUBUSKIE	-5.316	*** (1)	<b>1</b>	-4.390	*** (2)	<b>0</b>	-5.326	*** (1)	<b>0</b>	-4.284	*** (0)	<b>0</b>
WIELKOPOLSKIE	-9.430	*** (0)	<b>1</b>	-4.021	*** (6)	<b>0</b>	-3.753	** (5)	<b>1</b>	-6.598	*** (0)	<b>0</b>
ZACHODNIOPOMORSKIE	-2.989	*(3)	<b>0</b>	-3.771	** (6)	<b>0</b>	-3.892	*** (1)	<b>0</b>	-4.077	*** (1)	<b>0</b>
DOLNOŚLĄSKIE	-6.640	*** (0)	<b>1</b>	-2.737	*(3)	<b>0</b>	-6.389	*** (0)	<b>0</b>	-5.330	*** (0)	<b>0</b>
OPOLSKIE	-5.318	*** (0)	<b>1</b>	-5.901	*** (1)	<b>0</b>	-5.478	*** (0)	<b>0</b>	-4.948	*** (0)	<b>0</b>
KUJAWSKO-POMORSKIE	-3.147	** (3)	<b>0</b>	-5.616	*** (2)	<b>0</b>	-6.328	*** (0)	<b>0</b>	-4.475	*** (2)	<b>0</b>
POMORSKIE	-5.638	*** (2)	<b>1</b>	-8.256	*** (2)	<b>1</b>	-6.235	*** (0)	<b>0</b>	-5.769	*** (0)	<b>0</b>
WARMIŃSKO-MAZURSKIE	-3.749	** (3)	<b>1</b>	-5.780	*** (3)	<b>1</b>	-12.523	*** (2)	<b>0</b>	-4.887	*** (1)	<b>0</b>

Notes: \* significant at the 0.10 level; \*\* significant at the 0.05 level;  
 \*\*\* significant at the 0.01 level; ( ) lag lengths in parenthesis are determined by AIC;  
 bolded figures in separated cells refer to the established order of integration per each time-series.

Source: own calculations

Table 1 confirms that the percent changes in quarterly volumes for EU funds are usually burden for non-stationary. As shown in Table 1 and Table 2, other volumes are usually stationary within booth sectors (households and enterprises); therefore, we have to apply the Toda-Yamamoto approach frequently. We can see that the non-stationary volumes should be integrated of order one or rarely two, respectively. Hence, the highest additional lag lengths of Toda-Yamamoto approach should be estimated at two, in this study.

Tab. 2 Results of ADF unit root tests on variables of households

REGION	HOUSEHOLDS											
	Wages & salaries			Unemployment r			Employment r.			Vacancies		
ŁÓDZKIE	-4.260	*** (6)	<b>0</b>	-4.703	*** (0)	<b>0</b>	-5.365	*** (0)	<b>0</b>	-6.046	*** (3)	<b>1</b>
MAZOWIECKIE	-12.409	*** (4)	<b>2</b>	-4.667	*** (5)	<b>1</b>	-6.249	*** (5)	<b>0</b>	-5.890	*** (0)	<b>0</b>
MAŁOPOLSKIE	-3.152	** (6)	<b>0</b>	-4.256	*** (0)	<b>0</b>	-4.381	*** (3)	<b>0</b>	-4.604	*** (0)	<b>0</b>
ŚLĄSKIE	-4.879	*** (6)	<b>0</b>	-6.452	*** (0)	<b>0</b>	-5.629	*** (0)	<b>0</b>	-2.817	*(3)	<b>0</b>
LUBELSKIE	-3.577	** (6)	<b>0</b>	-5.345	*** (3)	<b>0</b>	-6.701	*** (1)	<b>0</b>	-6.259	*** (0)	<b>0</b>
PODKARPACKIE	-10.338	*** (2)	<b>0</b>	-3.782	*** (5)	<b>0</b>	-2.766	*(5)	<b>0</b>	-3.722	** (3)	<b>0</b>
PODLASKIE	-14.281	*** (2)	<b>0</b>	-4.577	*** (0)	<b>0</b>	-5.433	*** (0)	<b>0</b>	-5.510	*** (3)	<b>1</b>
ŚWIĘTOKRZYSKIE	-4.826	*** (6)	<b>0</b>	-4.689	*** (0)	<b>0</b>	-3.634	** (3)	<b>0</b>	-6.716	*** (0)	<b>0</b>
LUBUSKIE	-2.652	*(6)	<b>0</b>	-3.140	** (3)	<b>0</b>	-3.401	** (4)	<b>0</b>	-5.793	*** (0)	<b>0</b>
WIELKOPOLSKIE	-4.651	*** (2)	<b>0</b>	-4.098	*** (5)	<b>0</b>	-7.585	*** (0)	<b>0</b>	-4.263	*** (3)	<b>1</b>
ZACHODNIOPOMORSKIE	-3.085	** (6)	<b>0</b>	-3.137	** (3)	<b>0</b>	-5.758	*** (0)	<b>0</b>	-5.216	*** (0)	<b>0</b>
DOLNOŚLĄSKIE	-16.184	*** (1)	<b>1</b>	-4.738	*** (4)	<b>0</b>	-5.627	*** (0)	<b>0</b>	-6.634	*** (1)	<b>1</b>
OPOLSKIE	-3.710	** (6)	<b>0</b>	-4.579	*** (1)	<b>0</b>	-4.281	*** (0)	<b>0</b>	-7.923	*** (0)	<b>0</b>
KUJAWSKO-POMORSKIE	-11.444	*** (2)	<b>0</b>	-5.569	*** (6)	<b>0</b>	-5.688	*** (1)	<b>0</b>	-3.954	*** (0)	<b>0</b>
POMORSKIE	-14.300	*** (4)	<b>2</b>	-7.528	*** (6)	<b>0</b>	-4.442	*** (3)	<b>0</b>	-5.077	*** (0)	<b>0</b>
WARMIŃSKO-MAZURSKIE	-12.523	*** (2)	<b>0</b>	-3.505	** (4)	<b>0</b>	-6.882	*** (0)	<b>0</b>	-5.647	*** (0)	<b>0</b>

Notes: see notes under Table 1.

Source: own calculations

### 3.1 Granger causality tests

At this point, after knowing the maximum order of integration per each pair of volumes (always the higher figure), we can differ in which cases apply the conventional test for Granger causality (both volumes are stationary) or Toda-Yamamoto augmented approach (at least one volume is non-stationary). A summary of the results of the Granger causality tests – in conventional or Toda-Yamamoto version as necessary - is shown in Table 3 and Table 4 below.

**Tab. 3 Results of Granger causality tests from EU funds to variables of enterprises**

REGION	to Revenues			to Current assets			to Gross profit		
	Chi-square	p-value	df	Chi-square	p-value	df	Chi-square	p-value	df
ŁÓDZKIE	0.7534	0.8606	3	0.0853	0.7703	1	2.5805	0.1082	1
MAZOWIECKIE	0.6908	0.9525	4	3.0721	0.5458	4	2.1940	0.3339	2
MAŁOPOLSKIE	2.7701	0.5970	4	0.2448	0.6208	1	1.5389	0.6733	3
ŚŁĄSKIE	1.3683	0.7130	3	0.0273	0.8688	1	6.8618	0.1434	4
LUBELSKIE	0.0913	0.7625	1	0.0008	0.9778	1	0.0465	0.8293	1
PODKARPACKIE	0.7098	0.7013	2	0.8191	0.3655	1	0.1718	0.6786	1
PODLASKIE	0.3244	0.5690	1	0.0026	0.9593	1	0.0021	0.9637	1
ŚWIĘTOKRZYSKIE	1.5625	0.4578	2	4.8770	0.3002	2	2.0783	0.7214	4
LUBUSKIE	<b>3.6340</b>	<b>0.0566</b>	1	0.0598	0.8068	1	1.7402	0.1871	1
WIELKOPOLSKIE	1.9150	0.7514	4	<b>5.3619</b>	<b>0.0685</b>	2	2.1696	0.1408	1
ZACHODNIOPOMORSKIE	5.7105	0.2218	4	3.7544	0.1530	2	0.3751	0.8290	2
DOLNOŚLĄSKIE	<b>21.7950</b>	<b>0.0002</b>	4	<b>6.1554</b>	<b>0.0461</b>	2	2.4819	0.2891	2
OPOLSKIE	0.0867	0.7684	1	0.1527	0.6960	1	0.0379	0.8456	1
KUJAWSKO-POMORSKIE	0.9629	0.6179	2	0.0074	0.9315	1	1.5985	0.4497	2
POMORSKIE	1.1233	0.5703	2	0.9423	0.3317	1	0.0125	0.9109	1
WARMIŃSKO-MAZURSKIE	1.0347	0.7929	3	3.2182	0.3592	3	1.3381	0.5122	2

Notes: p-value means probability of the null hypothesis that no causal relation from EU funds to variable exists, and therefore bolded figures refer to its rejection at the 0.10 level which means that the causality exists, respectively; df means degree of freedom.

Source: own calculations

The presented summary (Table 3) indicates clearly that the p-values of figures related to the variables of enterprises are higher than desired significance in almost every case. If the p-value is lower than the 0.10 level, we reject the null hypothesis, and vice versa. Hence, we can see that EU funding don't Granger cause the gross profit of enterprises in any region. In the current assets perspective, the Granger causality has been found only in the regions of Wielkopolskie and Dolnoslaskie; any more than in the revenues perspective, where the Granger causality has been found in Lubuskie and Dolnoslaskie. Still these findings of major non-causality relationships look clearly, more or less; we must take attention to the Dolnoslaskie region. We can assume that null hypothesis rejection in only one or two regions per variable can be regarded as random event; yet, maybe, 2 of 3 rejections for a single region don't look like any true randomness. In addition, the null hypothesis can be rejected at the significance level of 0.05 or even less lower (0.0002) in the case of the revenues. Despite the results of Dolnoslaskie may be influenced by some unknown factors or errors, we can presume that the Dolnoslaskie region is unique; still, we don't have clear evidence to support such hypothesis. We can suggest beyond, the influence

of EU funding on examined variables of enterprises for Polish regions don't exist in general – with the exception Dolnoslaskie region.

**Tab. 4 Results of Granger causality tests from EU funds to variables of households**

REGION	to Wages and salaries			to Unemployment rate			to Employment rate			to Vacancies		
	Chi-square	p-value	d f	Chi-square	p-value	d f	Chi-square	p-value	d f	Chi-square	p-value	d f
ŁÓDZKIE	3.1590	0.3678	3	0.0280	0.8671	1	0.8345	0.3610	1	5.9995	0.1116	3
MAZOWIECKIE	<b>14.4138</b>	<b>0.0024</b>	3	<b>17.5354</b>	<b>0.0015</b>	4	6.0089	0.1985	4	0.6065	0.7384	2
MAŁOPOLSKIE	3.8789	0.4226	4	0.1942	0.6595	1	0.9837	0.3213	1	<b>4.2900</b>	<b>0.0383</b>	1
ŚLĄSKIE	3.9206	0.2702	3	1.1352	0.2867	1	0.0686	0.7933	1	6.0493	0.1955	4
LUBELSKIE	<b>6.9292</b>	<b>0.0742</b>	3	1.3684	0.2421	1	3.1411	0.5345	4	3.7861	0.4357	4
PODKARPACKIE	2.6274	0.4527	3	0.0554	0.8139	1	0.0029	0.9572	1	2.2593	0.6882	4
PODLASKIE	3.5608	0.4687	4	0.0183	0.8924	1	0.0239	0.8771	1	0.7299	0.3929	1
ŚWIĘTOKRZYSKIE	<b>17.9907</b>	<b>0.0004</b>	3	1.6967	0.7913	4	0.6719	0.4124	1	0.4099	0.5220	1
LUBUSKIE	<b>8.2560</b>	<b>0.0410</b>	3	0.1556	0.6932	1	0.6806	0.4094	1	0.0288	0.8651	1
WIELKOPOLSKIE	7.3549	0.1183	4	<b>8.3570</b>	<b>0.0392</b>	3	1.3479	0.2456	1	<b>4.5023</b>	<b>0.0339</b>	1
ZACHODNIOPOMORSKIE	<b>7.4466</b>	<b>0.0589</b>	3	1.4893	0.8285	4	0.4911	0.7823	2	<b>8.2210</b>	<b>0.0838</b>	4
DOLNOŚLĄSKIE	1.1519	0.8859	4	<b>4.9483</b>	<b>0.0842</b>	2	0.6625	0.7180	2	3.0890	0.5430	4
OPOLSKIE	0.7783	0.9413	4	0.1669	0.6829	1	2.4417	0.6551	4	0.2386	0.6252	1
KUJAWSKO-POMORSKIE	5.8420	0.2113	4	0.0001	0.9932	1	2.5308	0.2821	2	1.1247	0.2889	1
POMORSKIE	<b>7.7342</b>	<b>0.0918</b>	4	1.1602	0.7626	3	4.5690	0.3344	4	<b>8.5597</b>	<b>0.0731</b>	4
WARMIŃSKO-MAZURSKIE	3.2182	0.3592	3	1.9151	0.5902	3	0.0001	0.9924	1	2.2698	0.3215	2

Notes: see notes under Table 3.

Source: own calculations

Let us compare the results of the households' sector analysis (presented in Table 4) with the enterprises' sector analysis. We can see that the situation between influence of EU funds on variables of households is quite another even though no causality from EU funds to employment rate has been found. In the unemployment rate perspective, we found 3 causality relationships in Granger sense – in the regions of Mazowieckie, Wielkopolskie and Dolnoslaskie. Furthermore, we can see that 4 cases of Granger causality to the vacancies volumes have been found – Malopolskie, Wielkopolskie, Zachodniopomorskie and Pomorskie region; as well as we can see that EU funds do Granger cause average wages and salaries within 6 regions – Mazowieckie, Lubelskie, Swietokrzyskie, Lubuskie, Zachodniopomorskie and Pomorskie. In the light of these findings, it seems ambiguous to suggest that households can be definitely influenced by EU funding, or vice versa. The fact is that many regions seem to be influenced in the wages and salaries perspective, since 6 of 16 Granger caused regions have been found. The nature of these causalities has been judged in many aspects such as total amount and dynamics of financial resources spending, population structure development, economic growth, etc. However, we must conclude that no unambiguous explanation of mentioned causalities has been found.

Secondly, within 4 of 16 regions – Mazowieckie, Wielkopolskie, Zachodniopomorskie and Pomorskie - more than single causality relationship have been detected. Based on existence of several causalities in Granger sense, we can suggest that EU funding influence selected variables

of households in some regions only. Even though we checked above-mentioned reasons, we don't have convincing arguments to explain this distinctive development.

### 3.2 Development of co-financing structure

We also analysed the development of ratio between cash inflows from EU funds and national resources putted into co-financed projects (ratio). We don't distinguish between private and government resources in this simple comparison and we aggregate them both to so called national resources, respectively. A summary of the results of forthcoming analysis offers two possible ways of explanation and conclusions induction, at least. The ratio development reflects changes of resources gained by EU funds but reflects changes of national sources as well. Hence, its decreasing can refer to an decreasing of absolute share of EU funding as well as it can refer to an absolute increasing of national sources, or their combinations, respectively. We could discuss each of such scenarios indeed, and we could find arguments for desired effects in both ways; yet we favour only the way of “decreasing is positive because means that self-financing capacity of selected region is rising” for now. This approach is based on assumption of preferring financial independence which is allowed to be less risky rather than excessive dependence on exogenous cash flows (EU grants in this case); the cash flows which increasing can lead to the simultaneous inefficiency rising, in the “wasting of many” case. However, this issue is not under the scope of this analysis. Some figures of ratio development are shown in Table 5, where the ratio of every 3rd quarter and geometric mean over examined period per every region has been caught.

**Tab. 5 Development of ratio between EU funds and national resources**

REGION / PERIOD ( 20xx )	07q1	07q4	08q3	09q2	10q1	10q4	11q3	12q2	13q1	13q4	G.mean
ŁÓDZKIE	47.08	50.57	50.76	52.26	54.69	54.26	52.59	51.37	51.45	51.59	0.51
MAZOWIECKIE	52.26	54.29	54.71	54.39	54.42	54.03	52.87	52.91	52.11	52.04	-0.08
MAŁOPOLSKIE	48.55	51.55	53.85	52.42	53.14	52.88	52.59	50.15	49.77	50.30	0.22
ŚLĄSKIE	67.57	65.65	60.17	58.79	57.29	55.03	55.49	54.86	55.53	56.73	-0.61
LUBELSKIE	63.87	63.02	62.95	62.59	61.93	63.35	62.01	61.77	60.70	60.34	-0.24
PODKARPACKIE	60.66	58.03	59.60	58.81	58.14	56.30	55.89	55.15	56.54	57.14	-0.23
PODLASKIE	47.82	51.91	51.65	51.67	50.00	50.77	51.86	50.37	53.12	51.98	0.30
ŚWIĘTOKRZYSKIE	62.99	62.64	61.01	58.99	59.29	58.56	60.06	60.86	62.21	60.97	-0.26
LUBUSKIE	64.78	63.71	59.80	57.40	56.41	56.24	55.33	58.95	60.15	59.24	-0.44
WIELKOPOLSKIE	61.61	60.89	58.99	53.66	52.78	53.19	54.29	56.07	55.43	54.14	-0.47
ZACHODNIOPOMORSKIE	60.53	58.93	50.31	47.90	49.21	49.57	50.94	46.02	46.83	46.98	-0.91
DOLNOŚLĄSKIE	64.21	58.31	56.75	53.81	54.19	53.44	52.54	50.97	50.10	50.91	-1.05
OPOLSKIE	57.93	56.32	46.72	51.54	53.76	56.98	55.91	57.45	55.96	54.72	-0.19
KUJAWSKO-POMORSKIE	51.82	50.95	53.92	52.80	53.00	53.56	52.62	52.87	54.18	55.01	0.17
POMORSKIE	62.87	61.60	59.36	55.80	55.73	55.59	55.86	53.55	53.18	53.05	-0.63
WARMIŃSKO-MAZURSKIE	72.92	72.05	65.83	63.73	60.78	59.31	58.52	59.53	61.22	59.96	-0.78

Notes: G.mean refers to the geometric mean for the period 2007q1 to 2014q1

Source: own calculations

With defined assumption in mind, we can see that the average increasing of EU financing which is higher than its reflection in the national sources share (negative development) has been measured only within 4 of 16 regions – Łódzkie, Małopolskie, Podlaskie and Kujawsko-pomorskie. As a corollary of this, we can see that 12 of 16 regions decreased at the same time;



hence, these figures can suggest to increasing ability for self-financing of regional projects or perhaps regional economic potential altogether, respectively. Furthermore, one really interesting connection to previous analysis of causality has been found: no causality from EU funds to the variables of Lodzkie, Podlaskie and Kujawsko-pomorskie (where the geometric means of ratio are positive) has been found; and at the same time the regions of Dolnoslaskie, Wielkopolskie, Zachodniopomorskie, Pomorskie, and Lubuskie (all in the upper half of average decreasing rate) belong among the regions where two or three variables are caused by EU funds in Granger sense. These facts may lead us to presumption that EU funds influence the regional enterprises and households in particular within the regions where the own resources are activating at most. We can only consider nay but confirm this hypothesis until further analysis will be made.

## 4 Conclusions

In this paper we have examined the influence of EU funds spending on the variables of enterprises and households for NUTS II regions of Poland during the 2007q1 - 2014q1 period. The influence has been examined in light of the Granger causality – in conventional and so called Toda-Yamamoto augmentation for non-stationary volumes. The empirical analysis shows that there is no evidence of EU funds impacts on the selected variables of enterprises i.e. revenues, current assets and gross profit – with the exception of Dolnoslaskie region. Furthermore, the results of households' sector analysis suggest quite similar findings within the causality from EU funds to employment rate. In the unemployment rate and vacancies perspective, some cases of causality in Granger sense have been found but only for some regions. In the average wages and salaries perspective, the number of influenced regions has been higher – almost half of Polish regions have been caused by the EU funds in Granger sense. Based on low number of cases where Granger causality has been found, we can suggest that there is no unambiguous evidence of Granger causality from EU funds to selected variables of households and enterprises. In addition, we can present some regions within two or three variables are Granger caused by EU funding. Hence, we can assume that existence of relationships between EU funding and selected variables is rather determined by the region's uniqueness than by the nature of variable itself. The next findings rest in fact that in many cases the regions, where EU funding does Granger cause several variables, are connected with higher rate of ability to raise the ratio of national sources within co-financed projects, and vice versa. Considering these findings, it may be presumed that the involvement of private or governmental resources – attached to lowering the rate of financial dependence on EU funds - should cause tested variables much better than the EU funding itself. We can note that these conclusions of development of Polish regions are in accordance with aforementioned study of some other Central European countries where the national contributions look to have dominant impact on economic development of regions.

At least we can mention that the presented study shouldn't be the last step in the causality analysis of EU funding impacts on regional and national economics. The analysis answered some questions indeed, but putted many more questions that need to be answered as well. Considering all above-mentioned conclusions, we can advice only one thing to the eligible EU funding receivers and regional decision makers: "Don't blindly spend the money from EU funds because their impacts on regional economics are quite ambiguous while the rule of co-financing definitely

cause inefficient allocation of national resources, in the event that the EU money are inefficiently spending.” Since this eventuality can never be excluded in practice indeed.

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